REMARKS

The above-identified patent application has been amended and Applicants respectfully request the Examiner to reconsider and again examine the claims as amended.

Claims 1, 9-11, 13-18, 25, 27-30, 32, and 33 are pending in the application. Claims 1, 9-11, 13-18, 25, 27-30, 32, and 33 are rejected. Claims 1, 9, 28, and 33 are amended herein. Claims 12, 26, and 31 are objected to.

Claims 4-8, 19-24, 34, and 35 are withdrawn herein in accordance with an election filed August 26, 2005 in response to a Restriction Requirement dated July 26, 2005. Of the withdrawn claims, Claims 4-8 are withdrawn pending allowance of independent Claim 1, from which they depend, and should be allowable upon allowance of Claim 1.

Applicant's attorney would like to thank Examiner Ngo for the courtesy extended to Applicant's attorney during the telephone interview on January 10, 2006. The claimed invention of Claim 1 was discussed in view of a reference by Steiner et al. (U.S. Patent No. 6,356,068).

Applicants would like to point out for the Examiner's convenience that an Information Disclosure was filed by fax on November 14, 2005, just prior to the date of the present Office Action. Another Information Disclosure was electronically filed on December 7, 2005. Applicants respectfully request consideration of the cited art and return of signed and initialed forms indicating consideration by the Examiner.

The Rejections under 35 U.S.C. §102(b)

The Examiner rejects Claims 1, 9-11, 13, 17, 18, 25, 27-30, 32, and 33 under 35 U.S.C. §102(b) as being anticipated by Steiner et al. (U.S. Patent number 6,356,068).

Applicants submit that amended independent Claim 1 is patentably distinct over Steiner et al., since the cited reference neither describes nor suggests "... a lead frame having a plurality of leads, each one of the leads having a respective length; a current conductor portion comprising a coupling of at least two of the plurality of leads; a substrate having first and second opposing surfaces, the first surface proximate to said current conductor portion and the second surface distal from said current conductor portion; and one or more magnetic field transducers disposed on the first surface of said substrate, wherein *each one of the leads has a bend in a direction selected to result in each one of the leads being closer to the first surface of the substrate than to the second surface of the substrate throughout the length of the lead*.... ," as set forth in amended Claim 1.

The present invention provides an arrangement (e.g., as shown in FIG. 1) for which a substrate 16 is mounted in an integrated circuit 10 in conjunction with a lead frame 12 having a current conductor portion 14 such that the substrate 16 "...has an orientation that is upside down (i.e., the first surface 16a is directed downward) relative to a conventional orientation with which a substrate is mounted in an integrated circuit package." (page 4, lines 21-23). The substrate 16 has a magnetic field transducer 18 "...diffused into the first surface 16a, or otherwise disposed on the first surface 16a." (page 4, lines 11-13) The first surface 16a, which includes the magnetic field transducer 18, is directed downward toward the current conductor portion 14. Therefore, the claimed invention provides a so-called *flip chip* arrangement.

In contrast, as shown in Fig. 7 of Steiner et al., which shows an integrated circuit 6 in a completely assembled form, Steiner et al. describes a current monitor system including a die 1 (see e.g., Fig. 1), having two integrated Hall sensors 2 (see e.g., Fig. 1), which are on a top surface of the die 1 (see e.g., Fig. 1). The current monitoring system of Steiner et al. includes leads 4 (see e.g., Fig. 1, wherein the leads are bent as in Fig. 7 when fully assembled) and a current path 5 (see e.g., Fig. 1). In Fig. 7, the leads 11, which are the leads 4 of Fig. 1, each have a bend, resulting in the leads 11, for a portion of a length of the leads 11, being closest to the surface of the die 1 on which the two integrated Hall sensors 2 are disposed. However, for another portion of the length of the leads 11, the leads 11 are closest to the other surface of the

die 1. This result in a so-called lead-on-chip (LOC) arrangement, unlike the claimed invention, which results in the flip-chip arrangement, as described above. Steiner et al. neither describes nor suggests the claimed arrangement, wherein *each one of the leads has a bend in a direction selected to result in each one of the leads being closer to the first surface of the substrate than to the second surface of the substrate throughout the length of the lead.*

To avoid possible confusion, Applicants point out that the wire bonds 10 (see e.g., Fig. 5) of Steiner et al. are not leads and are not indicative of a mounting orientation of the current monitor system relative to a circuit board. Instead, the orientation for mounting to a circuit board is determined by pins 11 (Fig. 7), where it can be seen that the pins 11 have a bend indicative of an LOC arrangement.

In view of the above, Applicants submit that Claim 1 is patentably distinct over Steiner et al.

Claims 9-11, 13, 17, and 18 depend from and thus include the limitations of Claim 1. Thus, Applicants submit that Claims 9-11, 13, 17, and 18 are patentably distinct over the cited reference at least for the reasons discussed above in conjunction with Claim 1.

Applicants submit that Claim 13 is further patentably distinct over Steiner et al., since the cited reference neither describes nor suggests "... at least a portion of said current conductor portion has *a rectangular cross section having a minimum dimension less than a thickness of said lead frame*," as set forth in Claim 13. With this arrangement, at least a portion of the claimed current conductor portion is thinned. Advantages of this arrangement are described, for example, in conjunction with FIG. 9, at page 18, lines 9-19, where it is described that:

> It will be recognized that, in the presence of a current passing through the current conductor portion 254, the current conductor portion 254 being thinner, for example, than the current conductor portion 74 of FIG. 3, has a higher current density near the surface 254a than the current conductor portion 74 of FIG. 3 has near the surface 74a in the presence of a similar current. In other words, the

> current is compressed to be closer to the surface 254a than it would otherwise be with a thicker current conductor portion. As a result, a magnetic field generated by the current has a higher flux density in proximity to the surface 254a.
>
> Therefore, when the lead frame 250 is used in place of the lead frame 72 of FIG. 3, the Hall effect elements 78a, 78b experience a greater magnetic field, resulting in a more sensitive current sensor.

In contrast, the lead frame and the current conductor of Steiner et al. have a uniform thickness.

For reasons similar to those described above in conjunction with Claim 13, Applicants submit that independent Claim 25 is patentably distinct over Steiner et al., since the cited reference neither describes nor suggests "...a current conductor portion comprising a coupling of at least two of the plurality of leads, *at least a portion of the current conductor portion having a cross section with a predetermined shape selected to provide an increased flux density*," as set forth in Claim 25.

With this particular arrangement, in some embodiments, the cross section of the portion of the current conductor can have a reduced minimum dimension. In other embodiments, the shape can be, for example, a T-shape as shown in FIG. 9A and as se forth in Claim 26. The same advantages described above in conjunction with Claim 13 apply to the claimed predetermined shape of Claim 25.

In contrast, the lead frame and the current path 5 of Steiner et al. have a cross section with a uniform rectangular shape, which is not taught as being selected to provide an increased flux density. Rather, the uniform rectangular shape of Steiner et al. is selected in accordance with that which is provided by a conventional uniformly thick lead frame.

In view of the above, Applicants submit that independent Claim 25 is patentably distinct over Steiner et al.

Claims 27 and 28 depend from and thus include the limitations of Claim 25. Thus, Applicants submit that Claims 27 and 28 are patentably distinct over the cited reference at least for the reasons discussed above in conjunction with Claim 25.

For substantially the same reasons discussed above in conjunction with Claim 13, Applicants submit that Claim 27 is further patentably distinct over Steiner et al., since the cited reference neither describes nor suggests "... *the cross section is generally rectangular having a smallest dimension less than a thickness of said lead frame*," as set forth in Claim 27.

For substantially the same reasons discussed above in conjunction with Claim 1, Applicants submit that amended Claim 28 is further patentably distinct over Steiner et al., since the cited reference neither describes nor suggests "... each one of the leads has *a bend in a direction selected to result in each one of the leads being closer to the first surface of the substrate than to the second surface of the substrate throughout a length of the lead*," as set forth in Claim 28.

Applicants submit that independent Claim 29 is patentably distinct over Steiner et al., since the cited reference neither describes nor suggests "... a current conductor portion comprising a coupling of at least two of the plurality of leads, wherein *the current conductor portion comprises a loop having an inner dimension*... ," as set forth in Claim 29. With this particular arrangement, in some embodiments, the claimed current conductor portion (e.g., 14, FIG. 1) can have a loop as shown. In contrast, the current path 5 of Steiner et al. has no loop.

In view of the above, Applicants submit that independent Claim 29 is patentably distinct over Steiner et al.

Claims 30, 32, and 33 depend from and thus include the limitations of Claim 29. Thus, Applicants submit that Claims 30, 32, and 33 are patentably distinct over the cited reference at least for the reasons discussed above in conjunction with Claim 29.

Applicants submit that Claim 30 is further patentably distinct over Steiner et al., since the cited reference neither describes nor suggests "... at least *one of the one or more magnetic field transducers is disposed within the inner dimension*," as set forth in Claim 30. Whereas Steiner et al. does not describe or suggest the claimed current conductor portion having a loop, then Steiner et al. does not describe or suggest the claimed inner dimension.

For substantially the same reasons discussed above in conjunction with Claim 13, Applicants submit that Claim 32 is further patentably distinct over Steiner et al., since the cited reference neither describes nor suggests "... *at least a portion of said current conductor portion has a generally rectangular cross section having a smallest dimension less than a thickness of said lead frame*," as set forth in Claim 32.

For substantially the same reasons discussed above in conjunction with Claim 1, Applicants submit that amended Claim 33 is further patentably distinct over Steiner et al., since the cited reference neither describes nor suggests "... *each one of the leads has a bend in a direction selected to result in each one of the leads being closer to the first surface of the substrate than to the second surface of the substrate throughout a length of the lead*," as set forth in Claim 33.

In view of the above, Applicants submit that the rejection of Claims 1, 9-11, 13, 17, 18, 25, 27-30, 32, and 33 under 35 U.S.C. §102(b) should be removed.

The Rejections under 35 U.S.C. §103(a)

The Examiner rejects Claims 14-16 under 35 U.S.C. §103(a) as being unpatentable over Steiner et al. in view of Ohtsuka (U.S. Patent number 6,683,448). The Examiner recognizes that Steiner et al. does not teach the claimed amplifier disposed on the substrate. The Examiner relies upon Ohtsuka as teaching the claimed amplifier disposed on the substrate. The Examiner concludes that "[i]t would have been obvious to one having ordinary skill in the [art] at the time the invention was made to have amplifiers as taught by Ohtsuka... ."

Claims 14-16 depend from and thus include the limitations of Claim 1. Thus, Applicants submit that Claims 14-16 are patentably distinct over the cited reference at least for the reasons discussed above in conjunction with Claim 1.

In view of the above, Applicants submit that the rejection of Claims 14-16 under 35 U.S.C. §103(a) should be removed.

The Claim Objections

The Examiner objects to Claims 12, 26, and 31 as being dependent upon a rejected base claim, but indicates that Claims 12, 26, and 31 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claim.

For the above reasons, Applicants submit that independent Claim 1, from which Claims 12, 26, and 31 depend, is patentably distinct over the cited references. Therefore, Applicants submit that Claims 12, 26, and 31 are allowable in their present dependent form.

In view of the above Amendment and Remarks, Applicants submit that the claims and the entire case are in condition for allowance and should be sent to issue and such action is respectfully requested.

The Examiner is respectfully invited to telephone the undersigning attorney if there are any questions regarding this Amendment or this application.

The Assistant Commissioner is hereby authorized to charge payment of any additional fees associated with this communication or credit any overpayment to Deposit Account No. 500845, including but not limited to, any charges for extensions of time under 37 C.F.R. §1.136.

Respectfully submitted,

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